Claims

What is claimed is:

1. An apparatus comprising an accommodative stimulation device, an electromagnetic wave exposure device, and an imaging device, said apparatus acquiring imaging information about an eye by means of said electromagnetic wave exposure device and said imaging device, as said accommodative stimulation device simultaneously stimulates said eye to undergo at least one reversible accommodative transition from any first state of accommodation to any second state of accommodation, said accommodative stimulation device having an axis of projection that is substantially perpendicular to a visual axis of said eye, along which axis of projection an adjustable accommodative target is projected through a system of Badal optics, having a Badal optical axis coincident with said axis of projection, to strike a half-silvered mirror lying in a plane that forms an angle of about 45 degrees with said axis of projection and said visual axis of said eye.

2. The apparatus of claim 1, wherein said first and second states of accommodation are selectable from a range of accommodation defined by and inclusive of a state of total disaccommodation and a state of accommodation corresponding to the accommodative amplitude of said eye.

3. The apparatus of claim 1, wherein said accommodative stimulation device comprises a projection platform having a central longitudinal axis, an illuminating segment, an internal segment, and a projecting segment, said illuminating segment being adapted to receive a source of light, said central longitudinal axis defining said axis of projection, said internal segment

being adapted to receive at least one member of a set of exchangeable target-image-forming masks, toward which light from said source of light is directed, and said projecting segment being adapted to house a system of adjustable lenses for correcting any refractive error of said eye and receiving said light transmitted through said set of exchangeable target-image-forming masks for passage through said system of Badal optics onto said half-silvered mirror, thereby forming said adjustable accommodative target.

4. The accommodative stimulation device of claim 3, wherein said projection platform is attached to a computer-controlled motorized carriage that is moveable along an axis of travel parallel to a linear scale, the limits of which linear scale define a Badal space, said linear scale being calibrated in diopters of accommodative stimulus provided by said projection platform at each position of said projection platform along said axis of travel, said axis of travel and said linear scale being substantially parallel to said axis of projection, said axis of travel and said linear scale further being substantially perpendicular to said visual axis of said eye.

5. The accommodative stimulation device of claim 4, wherein said computer-controlled motorized carriage is moveable between any points within said Badal space within a period of time that is substantially less than a minimum response time for full accommodation in a mammalian eye.

6. The apparatus of claim 1, wherein said electromagnetic wave exposure device comprises a slit beam of a slit beam projection lamp and said imaging device comprises a Scheimpflug videography system.

7. The device of claim 1, wherein said electromagnetic wave exposure device comprises an electromagnetic wave emitter of a wavefront aberrometer and said imaging device comprises a wavefront aberrometer.

8. An apparatus comprising an accommodative stimulation device, a slit beam of a slit beam projection lamp projecting a slit beam substantially coincident with an anatomical sagittal plane of an eye and substantially coincident with a visual axis of said eye, and a Scheimpflug videography system having a Scheimpflug imaging plane and a Scheimpflug imaging lens plane that intersect said anatomical sagittal plane in a Scheimpflug alignment, said apparatus acquiring imaging information about said eye by means of said slit beam of said slit beam projection lamp and said Scheimpflug videography system, as said accommodative stimulation device simultaneously stimulates said eye to undergo at least one reversible accommodative transition from any first state of accommodation to any second state of accommodation, without loss of Scheimpflug alignment, said accommodative stimulation device having an axis of projection that is substantially perpendicular to a visual axis of said eye, along which axis of projection an adjustable accommodative target is projected through a system of Badal optics, having a Badal optical axis coincident with said axis of projection, to strike a half-silvered mirror lying in a plane that forms an angle of about 45 degrees with said axis of projection and said visual axis of said eye.

9. The apparatus of claim 8, wherein said first and second states of accommodation are selectable from a range of accommodation defined by and inclusive of a state of total disaccommodation and a state of accommodation corresponding to the accommodative amplitude of said eye.

10. The apparatus of claim 8, wherein said accommodative stimulation device comprises a projection platform having a central longitudinal axis, an illuminating segment, an internal segment, and a projecting segment, said illuminating segment being adapted to receive a source of light, said central longitudinal axis defining said axis of projection, said internal segment being adapted to receive at least one member of a set of exchangeable target-image-forming masks, toward which light from said source of light is directed, and said projecting segment being adapted to house a system of adjustable lenses for correcting any refractive error of said eye and receiving said light transmitted through said set of exchangeable target-image-forming masks for passage through said system of Badal optics onto said half-silvered mirror, thereby forming said adjustable accommodative target.

11. The accommodative stimulation device of claim 10, wherein said projection platform is attached to a computer-controlled motorized carriage that is moveable along an axis of travel parallel to a linear scale, the limits of which linear scale define a Badal space, said linear scale being calibrated in diopters of accommodative stimulus provided by said projection platform at each position of said projection platform along said axis of travel, said axis of travel and said linear scale being substantially parallel to said axis of projection, said axis of travel and said linear scale further being substantially perpendicular to said visual axis of said eye.

12. The accommodative stimulation device of claim 11, wherein said computer-controlled motorized carriage is moveable between any points within said Badal space within a period of time that is substantially less than a minimum response time for full accommodation in a mammalian eye.

13. A method comprising the steps of :

a. stimulating an eye to undergo at least one reversible accommodative transition from any first state of accommodation to any second state of accommodation by projecting a light from a light source on an illuminating segment of a projection platform that has an axis of projection and that is attached to a motorized carriage, through at least one member of a set of exchangeable target-image-forming masks on an internal segment of said projection platform, thereafter passing said light through a system of adjustable lenses for correcting any refractive error of said eye onto a system of Badal optics having a Badal optical axis coincident with said axis of projection, said Badal optical axis also being substantially perpendicular to a visual axis of said eye, said light emerging from said system of Badal optics and striking a half-silvered mirror lying in a plane forming an angle of about 45 degrees with said axis of projection and said visual axis, thereby forming an adjustable accommodative target; and,

b. adjusting said adjustable accommodative target by moving said motorized carriage along an axis of travel that is parallel to said axis of projection, between any two points within the limits of a parallel linear scale, at a rate that is substantially less than a minimum response time for full accommodation in a mammalian eye, said linear scale

being calibrated in diopters of accommodative stimulus provided by said projection platform at each position of said projection platform along said axis of travel, said axis of travel and said linear scale being substantially perpendicular to said visual axis of said eye; and,

c. simultaneously acquiring imaging information about said eye by simultaneously exposing said eye to electromagnetic waves and simultaneously imaging said eye during said least one reversible accommodative transition from any first state of accommodation to any second state of accommodation.

14. The method of claim 13, wherein said first and second states of accommodation are selectable from a range of accommodation defined by and inclusive of a state of total disaccommodation and a state of accommodation corresponding to the accommodative amplitude of said eye.

15. The method of claim 13, wherein said step of simultaneously exposing comprises simultaneously illuminating said eye using a slit beam of a slit lamp projection lamp and said step of simultaneously imaging comprises simultaneously videographing said eye using a Scheimpflug videography device.

16. The method of claim 13, wherein said step of simultaneously exposing comprises simultaneously exposing said eye to the emissions of an electromagnetic wave emitter of a wavefront aberrometer and said step of simultaneously imaging comprises simultaneously

profiling said eye using a wavefront aberrometer.

17. An accommodative stimulation device comprising an axis of projection that is substantially perpendicular to a visual axis of an eye, along which axis of projection an adjustable accommodative target is projected through a system of Badal optics, having a Badal optical axis coincident with said axis of projection, to strike a half-silvered mirror lying in a plane that forms an angle of about 45 degrees with said axis of projection and said visual axis of said eye; said accommodative stimulation device further comprising a projection platform having a central longitudinal axis, an illuminating segment, an internal segment, and a projecting segment, said illuminating segment being adapted to receive a source of light, said central longitudinal axis defining said axis of projection, said internal segment being adapted to receive at least one member of a set of exchangeable target-image-forming masks, toward which light from said source of light is directed, and said projecting segment being adapted to house a system of adjustable lenses for correcting any refractive error of said eye and receiving said light transmitted through said set of exchangeable target-image-forming masks for passage through said system of Badal optics onto said half-silvered mirror, thereby forming said adjustable accommodative target.

18. The accommodative stimulation device of claim 17, wherein said projection platform is attached to a computer-controlled motorized carriage that is moveable along an axis of travel parallel to a linear scale, the limits of which linear scale define a Badal space, said linear scale being calibrated in diopters of accommodative stimulus provided by said projection platform at

each position of said projection platform along said axis of travel, said axis of travel and said linear scale being substantially parallel to said axis of projection, said axis of travel and said linear scale further being substantially perpendicular to said visual axis of said eye.

19. The accommodative stimulation device of claim 17, wherein said computer-controlled motorized carriage is moveable between any points within said Badal space within a period of time that is substantially less than a minimum response time for full accommodation in a mammalian eye.